GUAM POWER AUTHORITY
P.O. BOX 2977
AGANA, GUAM 96932

TRANSMISSION & DISTRIBUTION SPECIFICATION

SPECIFICATION NO. E-058

FOR

15KV OIL-FILLED PADMOUNTED DISTRIBUTION SWITCH OUTDOOR, 600 AMPS, THREE PHASE

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1.0 SCOPE

1.1 This specification covers GPA requirements for padmounted, outdoor switches to be used on the 13.8 kV 60-Hertz distribution system.

1.2 The switch is intended for use in tropical weather conditions with a corrosive sea air atmosphere, with wind strength of 175 MPH or current IBC wind loading and subject to moderate and severe earthquakes.

2.0 CONFORMANCE TO SPECIFICATIONS

2.1 APPLICABLE DOCUMENTS

The most recent revisions of the following regulations and standards specify all pertinent requirements that oil-filled pad mounted switchgear must achieve or exceed:

2.1.1 IEEE Std. C37.74 – Requirements for pad-mounted load-interrupting switchgear up to 38 kV.

2.1.2 IEEE Std. C57.12.28 – Enclosure integrity for pad-mounted equipment.

2.1.3 IEEE Std. 386 – Separable insulated connector systems above 600 V.

2.1.4 IEEE Std. C57.12.90-2021 – Testing for liquid-immersed distribution equipment.

2.1.5 ANSI C2 – National Electrical Safety Code (NESC).

2.1.6 NFPA 70 (NEC) – National Electrical Code (relevant sections).

2.1.7 ASTM B117 – Salt spray (fog) corrosion resistance.

2.1.8 ASTM D4585 – Humidity resistance of protective coatings.

2.1.9 ANSI C37.72 – Standard for Subsurface, Vault, and Pad-mounted Load Interrupter Switchgear and Fused Load Interrupted Switchgear for AC Systems

2.1.10 ANSI D822 – UV Exposure Test Certification

2.1.11 ANSI Z55.1 – Colors for Color Coding
(formerly ANSI 255.1, Munsell Green 7.5GY 3.29/1.5)

2.2 DEVIATIONS AND NON-CONFORMANCE REQUIREMENTS

2.2.1 Deviations from this specification or changes in the material or design after the purchase order has been placed must be approved by the GPA Engineering department and acknowledged by a Purchase Order Amendment issued by GPA.

2.2.2 Units received with deviations or non-conformances that are not acknowledged per Section 2.2.1 are subject to rejection. The Supplier of rejected units is responsible for any corrective action including but not limited to materials, labor and transportation necessary to dispose of or make the units conform to the specification.

2.2.3 Notification of defective units discovered before or after installation that are believed to be inherent to manufacturing problems or workmanship shall be made and forwarded to the Supplier. The description of the item, documentation of the problem and the described information, disposition and/or follow-up (as appropriate) that GPA expects from the Supplier will be specified. The Supplier's response shall be made within thirty (30) days unless an extension is acknowledged and approved in writing by the GPA Manager of Engineering.

2.2.4 The supplier shall provide a signed statement verifying that the products being supplied fully comply with the specifications and drawings. Items not in full compliance with the specifications and drawings will be identified with a description of the deficiency and any proposed substitutions. Items not in full compliance with specifications and drawings must be approved by GPA Engineering Department as described in 2.2.1.

3.0 SUBMITTALS

3.1 The Bidder shall provide the following data with their bid submittal for oil-filled padmounted switch:

a) Nameplate Data (including Manufacturer Name, Nominal Voltage, Ratings, etc.)
b) Guaranteed Basic Impulse Level (BIL) Performance
c) Certificates of Testing & Inspection
d) Shop Drawings (must include loadbreak and deadbreak, bushings and wells, and all other accessories specified in specification)
e) Documentation demonstrating compliance with environmental durability requirements:

I. Certified test results for ASTM B117 Salt Spray (Fog) Testing – 1000 hours.
II. Certified test results for ASTM D822 Ultraviolet Exposure Testing (or ASTM G23 Type D equivalent) – 1000 hours.

3.2 GPA shall be allowed two (2) weeks to review and approve drawings provided in Section 3.1 without affecting the shipping date. Delays in delivery due to drawings that are disapproved during this review period are the responsibility of the Supplier.

3.3 Drawings returned to the Supplier as approved shall be considered authorization to proceed with the work. The approval of GPA shall in no way abrogate the requirements of this specification.

3.4 Instruction books shall be furnished which shall contain the description of components, parts and accessories, detailed installation instructions, complete instructions covering operation and maintenance of equipment, complete replacement parts list.

3.5 At least one complete set of drawings and instruction books per switch shall be provided at the time of delivery.

4.0 CERTIFIED LABORATORY TEST REPORTS

4.1 Certified tests shall be conducted in accordance with applicable standards. The Supplier shall furnish two (2) copies of certified test reports for all tests covered by this specification to the GPA Manager of Engineering within two (2) weeks of delivery.

4.2 Test reports shall include:

a) Dielectric testing (minimum 35 kV AC for 15 kV class per IEEE C37.74)
b) Mechanical operations testing
c) Leak testing (sealed tank)
d) Resistance and continuity testing

5.0 RATINGS

5.1 The switch rating requirements are as follows:

Nominal line to line voltage (kV)	15
Maximum line to line voltage (kV)	15.5
BIL (kV)	95
Continuous Current Rating (A)	600
Load Switching (A)	600
Fault-Closing Withstand (A)	20,000 (10 cycles, asymmetrical)
1-Second Withstand (A)	12,500 (symmetrical)
Interrupting Rating (A)	Up to 50,000 (fuse-dependent)

6.0 DESIGN AND CONSTRUCTION

6.1 General

6.1.1 The switchgear shall be a fully assembled, pad-mounted style, dead-front, outdoor, oil-filled vacuum-break switch rated for 15 kV nominal voltage and 600 A continuous load current.

6.1.2 The switchgear shall include vacuum interrupters, current-limiting fuses, oil-insulated bushings, and all accessories necessary for safe switching and system protection.

6.1.3 All internal live components shall be factory installed within a sealed, deadfront tank filled with mineral oil or Envirotemp™ FR3™ fluid.

6.1.4 All internal components including fuses, bushings, and vacuum interrupters shall be designed for safe field replacement without requiring tank depressurization or removal from service.

6.2 Vacuum Interrupters

6.2.1 Vacuum interrupters shall be rated for 15 kV class systems, 600 A continuous load, and 10,000 full-load operations without need for maintenance.

6.2.2 Switching shall occur within a hermetically sealed vacuum bottle, providing fast, restrike-free interruption at the first current zero.

6.2.3 Operation shall be via an externally mounted push/pull operating handle that may be padlocked in either position. Optional motor operation may be provided.

6.2.4 A visible-break feature shall allow visual confirmation of switch position without opening the main compartments.

6.2.5 A visible-break indicator shall be provided via a clear viewing window or external semaphore for operator confirmation of switch position.

6.3 Current-Limiting Fuses

6.3.1 Switchgear shall include full-range, liquid-immersed, current-limiting fuses suitable for use with 15 kV, 95 kV BIL, dead-front padmounted switchgear. Fuse holders shall support:

- Voltage Class: 15.5 kV rated
- Fuse Lengths: Nominal 19.0" to 21.2"
- Maximum Ratings: Up to 200 A (150E rating, 3-barrel design)

- Interrupting Rating: Minimum 50 kA, symmetrical
- Mounting: Compatible with hotstick-operable 200 A loadbreak elbows and submersible fusewells
- Construction: Liquid-immersed, suitable for use in fully sealed padmounted enclosure

6.3.2 Fuses shall provide fault interruption up to 50 kA, depending on system configuration and selected rating.

6.3.3 Fuses shall be housed in two-well, liquid-immersed holders accessible via hotstick. Fuse holders shall allow for safe replacement after load-side disconnection. Spare fuse clips shall be mounted internally within the fuse compartment.

6.3.4 A blown-fuse indicator shall be clearly visible and resettable.

6.3.5 Fuse compartments shall be equipped with locking mechanisms or interlocks to prevent fuse removal under energized conditions, ensuring personnel safety.

6.3.6 Fuse holders shall support 200 A liquid-immersed fuses suitable for 15 kV systems. Fuse replacement shall only be possible after disconnection of the 200 A loadbreak elbow, ensuring a visible break before fuse access.

6.4 Insulation Medium

6.4.1 Insulation shall be provided by electrical-grade mineral oil or, optionally, biodegradable and less flammable fluid such as Envirotemp™ FR3™, pre-filled at the factory. Use of SF_6 or greenhouse gas-based insulation shall not be permitted.

6.4.2 No field filling shall be required. A visible oil level gauge shall be installed.

6.4.3 A pressure-relief valve, operable by hotstick, shall be included for pressure management.

6.5 Bushings and Terminals

6.5.1 The switch shall include 600 A deadbreak aluminum bushings on the switch side and 200 A loadbreak bushings and inserts on the fuse side, as specified:

a) All 600 A bushings shall be provided with factory-installed deadbreak bushings compatible with industry-standard 600 A elbows (IEEE Std. 386).
b) All 200 A terminations shall include factory-installed bushing wells with loadbreak inserts already in place, suitable for immediate connection to 200 A loadbreak elbows (IEEE Std. 386).

6.5.2 All bushings shall conform to IEEE Std. 386 and be located a minimum of 24 inches above the pad.

6.5.3 Standoff brackets and provisions for grounding shall be included.

6.5.4 A clearly visible external mechanical or optical indicator shall confirm switch position without requiring door or cover removal.

6.6 Grounding

6.6.1 Each compartment shall include an ANSI 1/2-13 ground nut welded beneath each bushing.

6.6.2 1/2-inch copper grounding rod provisions mounted horizontally at the bottom of each compartment shall be provided.

6.7 Required Accessories

a) Oil sight gauge
b) Drain/fill plug with 3/8" sampler
c) Pressure-relief valve
d) Semaphore switch position indicators
e) Fault indicator provisions
f) Motorized operator (optional)
g) Stainless steel construction
h) SF6-free environment compliance via FR3 fluid

i) Anti-condensation heater for moisture control
j) 12-inch stainless steel spacer base for pad elevation

6.8 Configuration Options

The switchgear shall be available in the following standard compartment configurations. All configurations must maintain full compliance with operational ratings, safety, and test standards outlined in this specification.

6.8.1 Four-compartment arrangements:

a. 1 Switch / 3 Fuse: Radial feed applications with up to 3 protected loads/laterals. (See figure 1)
b. 3 Switch / 1 Fuse: Sectionalizing and loop feed application with one load/lateral. (See figure 2)
c. 2 Switch / 2 Fuse: Sectionalizing or loop feed applications with two loads/laterals. (See figure 3)

6.8.2 Two-compartment arrangement:

a. 1 Switch / 1 Fuse: Compact configuration for radial feed applications with one protected load/lateral. (See figure 4)

6.8.3 GPA shall specify the type required at the time of order.

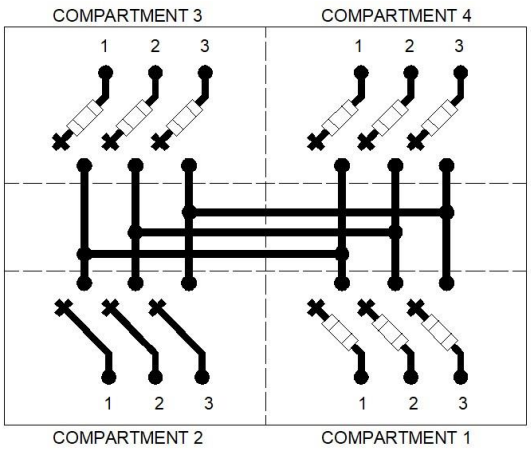

FIGURE 1
(1 SWITCH, 3 FUSE)

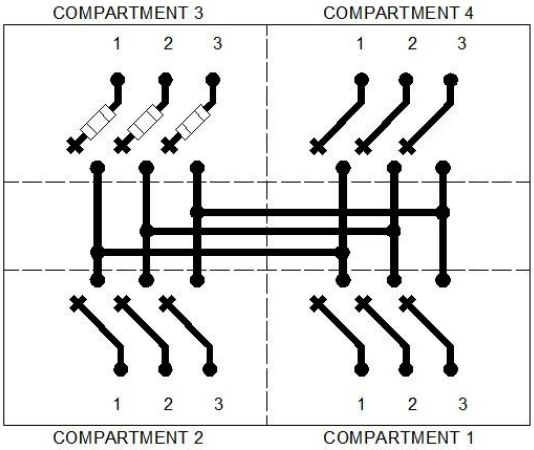

FIGURE 2
(3 SWITCH, 1 FUSE)

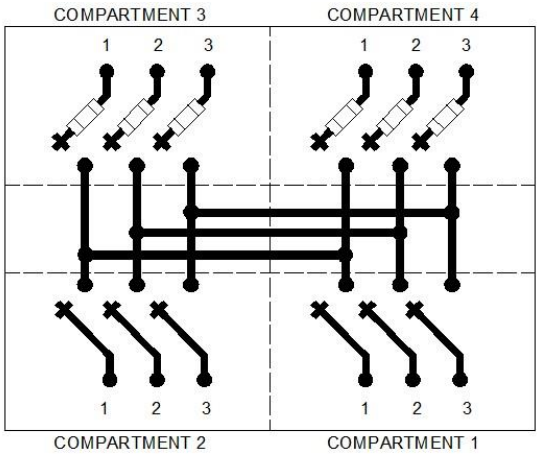

FIGURE 3
(2 SWITCH, 2 FUSE)

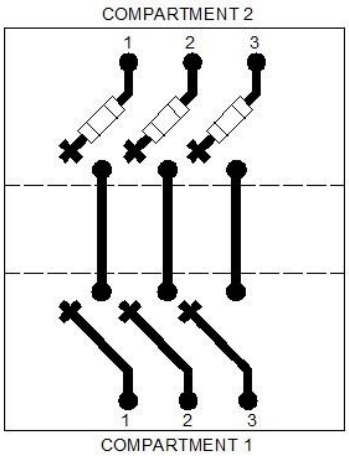

FIGURE 4
(1 SWITCH, 1 FUSE)

6.8.4 At the time of order, GPA shall provide the required dimensions of the switches to match existing concrete pads.

6.8.5 All compartments shall be fully enclosed and isolated for safety and service access, with stainless steel construction and split side-hinged

doors per Section 7.1. Optional configurations shall be considered upon approval by GPA Engineering.

6.9 The switchgear shall be designed to remain operational and fully submersible up to 3 meters of water head, with hermetically sealed construction per IEEE Std C37.74.

6.10 Enclosure

6.10.1 The enclosure shall be a low-profile, tamper-resistant, pad-mounted design suitable for outdoor installation in high-humidity, coastal, and high-wind environments.

6.10.2 The switchgear tank, doors, hinges, and enclosure shall be constructed of Type 304 or 304L stainless steel, fully welded using AISI 308 filler material.

6.10.3 The tank shall be leak-tested at the factory and provided with:

a) Oil fill and drain ports with 3/8" sampling access
b) A visible oil level gauge
c) A pressure-relief valve above the liquid level
d) Penetrations sealed with double O-rings

6.10.4 Split, side-hinged doors shall be provided on both the source and load (tap) compartments. Doors shall include:

a) Stainless steel continuous hinges
b) Recessed stainless-steel pentahead bolts
c) Padlockable provisions
d) Door stops to secure open position during maintenance

6.10.5 Fuse compartments shall include side-hinged or vertically accessible doors that permit hotstick access to fusewell caps. Spare fuse storage clips shall be provided within the fuse compartment

6.10.6 An oil fuse drip tray shall be provided to catch expelled oil during fuse replacement.

6.10.7 Recessed lifting provisions shall be incorporated into the structure for balanced handling.

6.10.8 The Switchgear shall be free of SF6 and use only mineral oil or Envirotemp™ FR3™ insulating fluids.

6.11 Paint and Finish

6.11.1 Exterior surfaces shall be finished in Munsell 7GY 3.29/1.5 Olive Green over 304L stainless steel**,** meeting utility standards

6.11.2 The finish shall meet the following test standards:

a) ASTM B117: 1000-hour salt-spray corrosion resistance
b) ASTM G53: 500-hour UV weathering resistance
c) ASTM D2794: Impact resistance

6.11.3 Welds along the enclosure base shall be protected with a wax-based anti-corrosion barrier, and a resilient closed-cell gasket shall isolate the base from concrete.

6.12 Labels and Nameplates

6.12.1 A permanent nameplate shall be installed on the exterior surface and include:

a) Manufacturer name
b) Catalog and model number
c) Serial number
d) Date of manufacture

6.12.2 A ratings label shall be mounted inside each door listing:

a) Voltage and BIL
b) Continuous and fault ratings
c) Fuse type and ratings

6.12.3 A three-line one-line diagram with interrupter switches, fuses, and bus connections shall be mounted inside each door and switch handle cover.

6.13 Safety and Signage

6.13.1 External “WARNING – KEEP OUT – HAZARDOUS VOLTAGE INSIDE” signs shall be affixed to all access doors.

6.13.2 Internal signage shall indicate:

a) Backfeed hazards
b) Live-part barriers
c) Maintenance precautions

6.13.3 Interrupter compartments shall include "Visible-Break" viewing features to confirm switch position safely.

7.0 QUALITY CONTROL

7.1 The supplier shall maintain a documented quality control program to ensure all equipment conforms to the requirements of this specification.

7.2 The program shall include inspection and testing checkpoints at critical stages of production, including:

a) Material inspection
b) Weld and fabrication verification
c) Dielectric and pressure testing
d) Vacuum interrupter function testing
e) Final inspection and finish evaluation

7.3 Documentation shall be made available upon request and shall include:

a) Inspection records
b) Test report
c) Certification of materials and components
d) Final assembly checklists

7.4 The switchgear shall be tested in accordance with IEEE Std C37.74 and applicable ANSI and NEMA standards.

8.0 SERVICE LIFE AND SPARE PARTS

8.1 The vacuum interrupter and switch mechanism shall be rated for 10,000 full-load switching operations at 15 kV / 600 A without maintenance.

8.2 The Supplier shall provide a list of recommended spare parts, including fuse elements, gaskets, handles, and labeling for maintenance support. The Supplier shall guarantee parts availability for a minimum of 20 years.

9.0 PACKING AND SHIPPING

9.1 The switchgear shall be fully assembled, filled with insulating fluid, and securely packaged for transport. All ports and access points shall be sealed to prevent contamination or leakage.

9.2 All units shall be block-crated or securely fastened to prevent movement during shipment.

9.3 Each shipment shall include:

a) Complete instruction manuals
b) A copy of test reports
c) A copy of the final approved shop drawings
d) Clearly labeled crate markings including GPA purchase order number and switchgear rating

9.4 Handling instructions shall be attached to each unit and clearly indicate lifting points and orientation requirements

Appendix A

15KV OIL-FILLED PAD-MOUNTED DISTRIBUTION SWITCHGEAR

NOTE: Please complete the product information and provide the required documents. Incomplete information shall be cause for rejection.

PRODUCT INFORMATION

	Section	Description				Circle or Specify Applicable Options	
1.	6.8.3	Switch Configuration	1 Switch, 3 Fuse	3 Switch, 1 Fuse	2 Switch, 2 Fuse	1 Switch, 1 Fuse	
2.	5.1	Nominal & Maximum Line to Line Voltage: 15kV				YES	NO
3.		BIL Rating: 95 kV				YES	NO
4.		Continuous Current Rating & Load Switching Rating: 600A				YES	NO
5.		Fault Closing Withstand: 20,000 A, asymmetrical				YES	NO
6.		1-Second Withstand: 12,500 A, symmetrical				YES	NO
7.	6.2.4	Visible-Break Viewing Feature				YES	NO
8.	6.3	Blown Fuse Indicator				YES	NO
9.		Fuse Compartment Interlock (prevents removal while energized)				YES	NO
10.		Fuse Type and Rating: 200A, Loadbreak (Specify)					
11.		Fuse Holder Type and Model (Specify)					
12.		Switch Side Bushing: 600 A Deadbreak, per IEEE Std 386				YES	NO
13.	6.5.1	Fuse Side Bushing: 200 A Loadbreak, per IEEE Std 386				YES	NO
14.	6.7	Oil Sight Gauge				YES	NO
15.		Pressure Relief Valve				YES	NO
16.		Drain/Fill Plug with Sampler				YES	NO
17.		Switch Position Indicator | external/semaphore				YES	NO
18.		12” Stainless Steel Base Spacer Included				YES	NO
19.	6.9	Fully Submersible | per IEEE C37.74, 3m				YES	NO
20.	6.10.2	Material | Type 304/304L Stainless Steel				YES	NO
21.	6.10.4	Padlockable Operating Handle				YES	NO
22.	6.10.5	Spare Fuse Storage				YES	NO
23.	6.10.8	Insulating Fluid (Specify)					
24.	6.11.1	Finish Color | ANSI Z55.1, Munsell 7.5GY 3.29/1.5				YES	NO

Required Documents

1.	Sample Nameplate Data	YES	NO
2.	Connection Diagrams	YES	NO
3.	Shop Drawings	YES	NO
4.	ASTM B117 Salt Spray Test Certification (1000 hours)	YES	NO
5.	ASTM D822 UV Exposure Test Certification (or ASTM G23 Type D equivalent, 1000 hours)	YES	NO